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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Kyoichi NARIAI
Title: PIEZOELECTRIC ELEMENT
DRIVING CIRCUIT AND DRIVING
METHOD
Appl. No.: 09/576,492
Filing Date: 05/23/2000
Examiner: K. Addison
Art Unit: 2834



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REPLY AND REQUEST FOR RECONSIDERATION UNDER 37 CFR 1.111

Commissioner for Patents
Washington, D.C. 20231

Sir:

This communication is responsive to the Office Action dated February 12, 2002, concerning the above-referenced patent application.

REMARKS

Claims 1-11 are pending in this application. Claims 9-11 are allowed. Claims 1-8 have been rejected under 35 U.S.C. § 103. Reconsideration is respectfully requested.

The Examiner has objected to Claims 1-8 under 35 U.S.C. § 103(a) as being unpatentable over applicant's admitted prior art and Puskas, U.S. Patent No. 5,834,871. This rejection is respectfully traversed.

Applicant's Claim 1 recites a piezoelectric element driving circuit for driving a plurality of piezoelectric elements disposed in a plurality of inkjet head units, comprising, *inter alia*, a plurality of flexible flat cables disposed between a plurality of power amplifiers and the plurality of inkjet head units for connecting the plurality of inkjet head units and the plurality of power amplifiers. Similarly, Applicant's Claim 7 recites a method for driving a plurality of Piezoelectric elements disposed in a plurality

of inkjet head units, each of which has, *inter alia*, a plurality of flexible flat cables for connecting a plurality of head units to a plurality of power amplifiers. These limitations are not disclosed or suggested by the prior art cited by Applicant or in Puskas.

Applicant's disclosed prior art shows a piezoelectric element driving circuit having a *single* power amplifier driving a *single* flexible cable. There is no disclosure or suggestion of a plurality of power amplifiers or a plurality of flexible cables in the prior art disclosed by Applicant. In fact, problems associated with extending the concept of a single power amplifier driving a single flexible cable into a plurality of power amplifiers and a plurality of flexible cables are detailed by Applicant in the application as originally filed at, *inter alia*, page 3, line 13 to page 4, line 3; and at page 6, lines 3-16. Among other things, and as stated previously by Applicant, the increased cost and complexity of such a configuration would not motivate one skilled in the art extend a single power amplifier and single flexible cable into a plurality of power amplifiers and a plurality of flexible cables.


Puskas is directed toward systems and methods for ultrasonic cleaning. Puskas discloses using multiple generator circuits to drive multiple transducers. (Puskas, figures 9a and 10.) Puskas does not disclose or suggest connecting the multiple generator circuits to the multiple transducers using a plurality of flexible cables. Rather, Puskas uses a single multiplexer to connect the generators to the transducers. A multiplexer is essentially a multi-throw switch, having characteristics not related to a flexible cable. Among other things, use of a multiplexer as disclosed in Puskas will present essentially the same resistance to each power generator circuit in Puskas. In contrast, each power amplifier in embodiments of Applicant's invention sees a unique resistance associated with each flexible cable. Furthermore, use of a multiplexer in embodiments of Applicant's invention would not mitigate the capacitive loading effect of the plurality of piezoelectric elements on the power amplifiers. In contrast, using a plurality of flexible cables to connect the plurality of power amplifiers to the plurality of piezoelectric elements as claimed by Applicant, the capacitive loading effect of the piezoelectric elements seen by the power amplifiers is reduced. Accordingly, embodiments of Applicant's invention entail more than just a mere duplication of working parts as suggested by the Examiner.

Thus, Applicant recites limitations not disclosed or suggested in the prior art disclosed by Applicant or in Puskas. Therefore, a *prima facie* case of obviousness has not been made. Applicant respectfully submits that Claims 1 and 7, and Claims 2-6, which depend either directly or indirectly from Claim 1, and Claim 8, which depends directly from Claim 7, are in condition for allowance.

Applicant gratefully acknowledges the Examiner's allowance of Claims 9-11.

Respectfully submitted,

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